



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/585,729

07/12/2006

Tadashi Maeda

043890-0927

7206

20277 7590 01/27/2010  
MCDERMOTT WILL & EMERY LLP  
600 13TH STREET, N.W.  
WASHINGTON, DC 20005-3096

EXAMINER

SAAD, ERIN BARRY

ART UNIT

PAPER NUMBER

1793

MAIL DATE

DELIVERY MODE

01/27/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/585,729	<b>Applicant(s)</b> MAEDA ET AL.	
	<b>Examiner</b> ERIN B. SAAD	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11 December 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) 1-3 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 4-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☒ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 4-7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Newly amended claim 4 discloses "the first electrode includes at least a first bump and a second bump and the second electrode includes at least a first circuit electrode and a second circuit electrode". According to the specification, the circuit electrode 2 is the second electrode and the electrode 4B is the first electrode (paragraph 0024). The specification does not teach or suggest that the second electrode includes more than one circuit electrode.

Claim 4 also discloses that "in the step of letting molten solder come in contact with the first electrode, the first bump is in direct contact with the first circuit electrode, while the second bump is not in contact with the second circuit electrode. According to the specification, before melting, the first bump is in direct contact with the first circuit electrode while the second bump is not in contact with the second circuit electrode

Art Unit: 1793

(figure 1C and paragraph 0033) and then, after melting, the second bump is in contact with the second circuit electrode (paragraphs 0034-0038). The specification does not teach or suggest that the solder is molten (melted) when the first bump is contact with the first electrode while the second bump is not in contact with the second circuit electrode.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 4-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 is indefinite because it is unclear what is meant by "the first electrode includes at least a first bump and a second bump and the second electrode includes at least a first circuit electrode and a second circuit electrode". According to the specification, the circuit electrode 2 is the second electrode and the external connection electrode 4B is the first electrode (paragraph 0024). It is not understood how the second electrode can include two circuit electrodes. It is also unclear what comprises the "bumps". It is not understood if the bumps include the flux/soldering paste and solder or just solder (it is also noted that Applicant does not claim solder bumps). For the purpose of examination, the second electrode will include a (one) circuit electrode and the first and second bumps will include the flux/soldering paste 3 and the solder 6.

Art Unit: 1793

Claim 4 is indefinite because it is unclear what is meant by “in the step of letting molten solder come in contact with the first electrode, the first bump is in direct contact with the first circuit electrode, while the second bump is not in contact with the second circuit electrode”. According to line 9 of claim 4, the molten solder comes in contact with the first electrode and the second electrode by melting the solder. According to the disclosure of the application, before melting, the first bump is in direct contact with the first circuit electrode (external connection electrode), while the second bump is not in contact with the second circuit electrode (circuit electrode) (figure 1B and paragraphs 0024-0026, 0033-0034) and then, after melting, the second bump is in contact with the second circuit electrode (paragraphs 0034-0038).. For the purpose of examination, the limitation will read “before letting molten solder come in contact with the first electrode, the first bump is in direct contact with the first circuit electrode, while the second bump is not in contact with the second circuit electrode.”

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

Art Unit: 1793

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 4-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al (US 6,189,771) in view of Mei (US 6,680,128), and further in view of the collective teachings of Kodas (US 6,951,666) and Kang et al (US 5,837,119).

In regards to claim 4, Maeda teaches a method for soldering a first electrode with a solder portion to a second electrode, as observed in the sequences depicted in figures 4A-4B, where electrode 18 (shown but not labeled in figure 4; shown and labeled in figure 3 which is an embodiment of figure 4) and electrode 12 are the first and second electrode, respectively, using a metal (solder) paste that is coated with flux comprising either tin, lead, zinc, gold, silver, copper, antimony, indium, or bismuth filled between the soldering portion and the second electrode by positioning the first electrode directly above the second electrode where the metal paste 5 placed on the solder ball 19 (metal paste 5, figures 4A-4B). Maeda discloses letting solder come in contact with the first electrode and the second electrode by melting the solder under heat and wetting and spreading the molten solder along the surface of the metal powder guiding/directing the molten solder (column 3 lines 22-35 and column 5, lines 13-65). Maeda discloses that the first electrode includes a first bump 19 and a second bump 5 where the first and

Art Unit: 1793

second circuit electrode are connected to the first bump and the second bump by soldering (figure 4A-4B, column 1 line 61 to column 2 line 9 and column 5, lines 13-65). Maeda also discloses that the solder comes in contact with the first electrode 18 and the first bump 19 is in direct contact with the first electrode while the second bump 5 is not in contact with the second circuit electrode.

Maeda teaches that the metal paste is made by mixing a metal and flux (column 4, lines 1-4). However, Maeda fails to teach that the paste includes a liquid basis formed of resin component, an activator removing oxide film produced on surfaces of the solder portion, a metal powder having at least flake-like shaped metal powder including a core metal and a surface metal to cover surfaces of the core metal, as well as the metal powder having at least a flake-like shaped figure.

However, Mei teaches solder pastes where a particular solder composition is most preferably a metal alloy of tin and zinc (core metal) coated with a material preferably selected from copper, silver, palladium, tin, or gold (Column 2, lines 19-24). Mei also teaches that the coated solder composition used in the solder paste is also suitable for being combined with a flux containing a rosin, derivatives of a rosin such as a dimerized resin, an activator, and a solvent (Column 4, lines 40-49), thus the paste would have a sense of liquidity (liquid basis). Where the solder composition is mixed with the flux to form a roughly 50-50 mix of flux and solder composition (column 4, lines 60-62), thus for it to be a paste it would be necessarily inherent that the paste would have liquidity since, in regards to the particular limitation of claim 4, reciting that the surface metal would be dissolved into the core metal, this would inherently happen

Art Unit: 1793

depending on the thickness of the surface metal that is coating the core since it is exposed to the reflow process directly (column 4, lines 8-11). In view of Mei's teachings, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine, with Maeda's soldering method that solders together two electrodes by a soldering bump through the use of a soldering paste, a particular soldering paste that contains a core and surface metal, since using a paste that contains a core and surface metal would allow for lower melting points, longer shelf life, and better effective wettability properties (Mei, Column 3, lines 5-10).

Kodas teaches the use of metal powders that have a flaky form with very large aspect ratios (column 4, lines 60-66) to form conductive features (column 35, lines 1-18). Where according to Kang et al, soldering or electrically conductive pastes (column 2, lines 20-25) with metal powders in the flaky form because of their higher aspect ratios are more desirable than metal powder in the regular spherical form because flaky powders provide for better electrical conduction because of their larger aspect ratios, i.e. length of the flake is larger than the width of the flake (Kang, column 5, lines 35-40). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Maeda in view of Mei to use flake-like metal powders since their higher aspect ratios allow for better electrical conduction, as taught by the collective teachings of Kodas and Kang.

In regards to claim 5, Wherein the core metal is selected from the group of tin, zinc, lead, and indium, and the surface metal includes any one of gold and silver, Mei teaches that the solder composition (core metal) can be either tin or zinc, while the



Art Unit: 1793

coating material (surface metal) can be either copper, silver, palladium, tin, or gold (Column 2, lines 19-24).

In regards to claim 6: wherein the core metal includes tin or tin-based alloy, and the surface metal includes silver (Mei, column 2, lines 19-24).

In regards to claim 7: The soldering paste of claim 4, wherein amount of the metal powder is 1-20 vol % (Kodas, column 35, lines 1-15, where the precursor composition is the soldering paste and includes metals such as silver (metal particle, column 24, lines 35-38, where it is mentioned before that these particles may be flakes) and tin (molecular metal precursor, column 24, line 37) used for solder replacements or high conductive features (column 35, lines 10-16), and where Kodas discloses that the precursor composition includes between 20 and 50% vol percent metal powder (column 27, lines 62-67), thus rendering the instant claim obvious.

### ***Response to Arguments***

8. Applicant's arguments filed 12/11/2009 have been fully considered but they are not persuasive.

9. The Applicant argues that the Prior Art of record does not disclose the newly added limitations.

First, the Examiner would like to point out that the new limitations are rejected as new matter as stated in paragraphs 1-2 above. The Examiner disagrees with Applicant's argument. While the embodiment and figures of Maeda used in the previous rejection did not disclose the newly added limitations, a second embodiment

Art Unit: 1793

and figures of Maeda does disclose the new limitations. The claims are rejected as stated above.

### ***Conclusion***

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ERIN B. SAAD whose telephone number is (571)270-3634. The examiner can normally be reached on Monday through Thursday from 8am-5pm Eastern time.

Art Unit: 1793

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on (571) 272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/E. B. S./  
Examiner, Art Unit 1793  
1/12/2010

/Jessica L. Ward/  
Supervisory Patent Examiner, Art Unit 1793